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6.0 LAND USE

The following section describes how land around the Forest has been utilized in the past, how it is being used today, and the likely changes that can be expected. Patterns in land conversion provide the estimates of change, but indirectly cultural and social pressures may also give us a view into the future.

This section will focus on the Forest Region only. Areas in southern New Hampshire and Maine have had different trends in land use conversion and will continue to experience different development pressures in the future. These areas will be discussed only briefly to draw important broad comparisons to the Forest Region.

Several thorough examinations of land use in the Region have been completed in recent years, from which the following sections draw heavily. These sources should be utilized further, beyond the scope of this land use assessment, as they cover many important land use questions in greater depth. The Society for the Protection of New Hampshire Forests (SPNHF) has published two documents, *New Hampshire's Changing Landscape* (1999) and *New Hampshire's Vanishing Forests* (2001) which reveal patterns of land conversion, fragmentation, and population growth for New Hampshire. The U.S. Forest Service published *Land in Maine: Determinants of Past Trends and Projections of Future Changes* in 1999. Additionally, information is drawn from other U.S. Department of Agriculture data sources.

6.1 HISTORY OF LAND USE CHANGE ON AND OFF THE FOREST

The European colonization of New England began the very rapid decline of forest cover in the Region. Prior to their arrival, forest cover was estimated to be near 95% (Sundquist and Stevens, 1999). Following this period, there was a long and steady decline in forest cover with the rapid expansion of farms across New England. The Civil War brought an end to this expansion, and many people abandoned their farms for better land further west. From roughly the 1870s up until the mid 1980s, forest cover continued to increase on these abandoned farms. The trend of farm to forest conversion still occurs, although increasing rates of land development have reversed this in New Hampshire.

6.2 LAND USE OFF THE FOREST

6.2.1 Current

Presently, land holdings around the Forest can be described as industrial private, non-industrial private, and public. The White Mountain National Forest is the largest holding of public land in New Hampshire, but represents only a small share of Maine's public land. Sundquist and Stevens state that 22% of New Hampshire is protected, of which over half is the White Mountain National Forest. Northern New Hampshire contains more than 70% of these protects lands.

Figure 6-1 portrays recent satellite imagery of land use in the Forest Region. Since some categories of use represent small land areas, many were aggregated together to create the categories depicted in this map. Without this aggregation, discerning non-forest use patches was very challenging. Red shading indicates developed land, which is focused around the towns of Lebanon, Hanover and Littleton in Grafton County, Berlin in Coos County, North Conway in Carroll County and Rumford in Oxford County. Other smaller economic centers throughout the region show developed patches. These smaller development centers follow major travel routes in the Forest Region. Concentrated agricultural use, shown in yellow, can be seen along the western edge of New Hampshire near the Connecticut River Valley and along the southern parts of Maine and New Hampshire. This figure illustrates that the only

area off the Forest sharing the same pattern of land use is northern Oxford and Franklin counties in Maine. These areas, like the Forest Region, have the largest sections of land in continuous forest.

6.2.2 Land Use Change Since 1986

Understanding patterns of land use changes from 1986 to the present allow us to examine what new considerations are required since the last Forest Plan was initiated. Most relevant to the Forest are changes in total farmland, forest, and developed areas. Other subtle changes to water bodies from beavers or anthropogenic causes (hydro-electric dams) will not be discussed here.

6.2.2.1 Change in Farmland

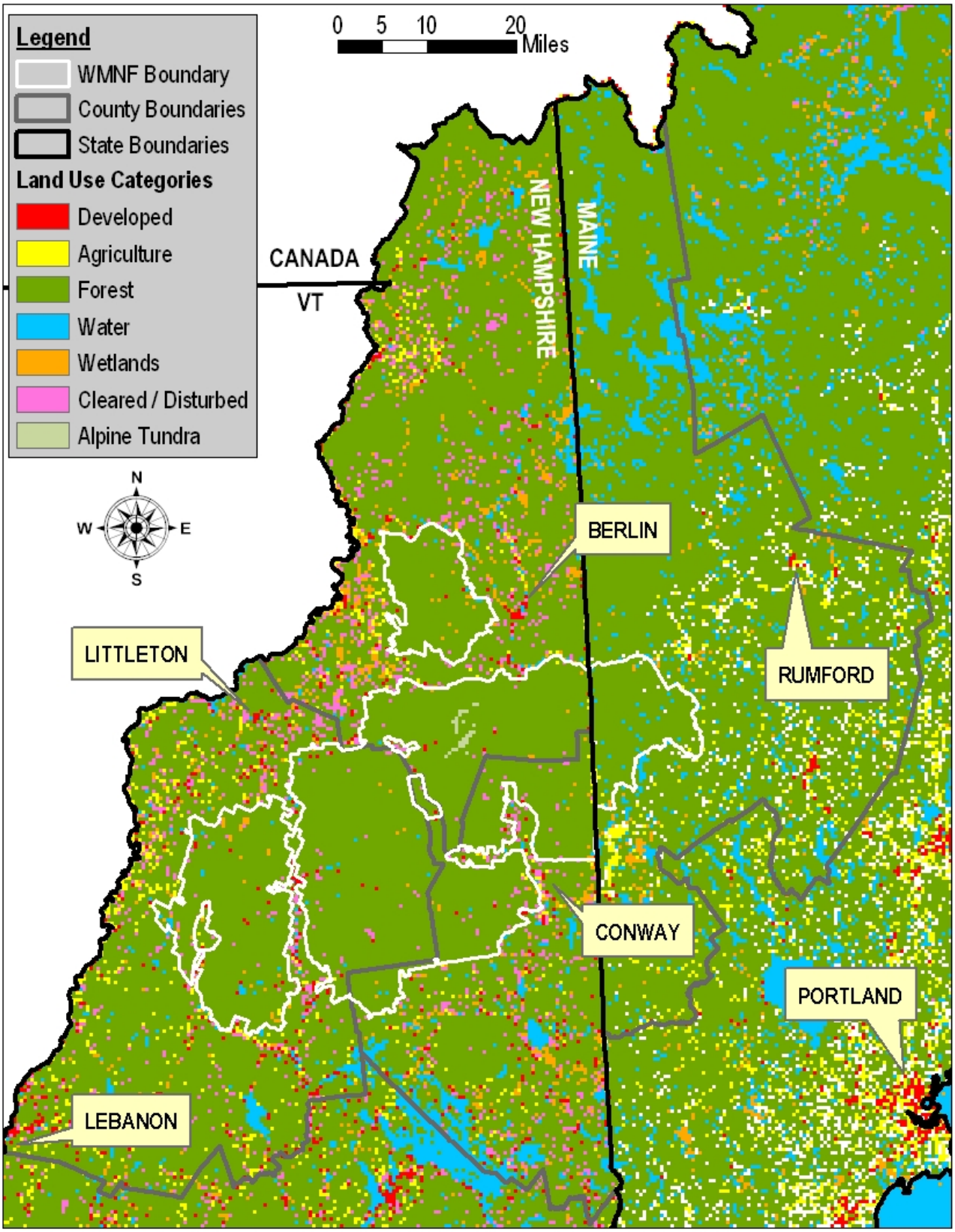
Data gathered from the U.S. Department of Agriculture on farmland in the Four Counties reveal an overall loss of farmland and a decline in the average size of farms over a ten year period. However, the number of farms increased in all Four Counties. Only Maine as a whole showed an overall reduction in total farms. The numbers of farms, total farmland, and average farm size from 1987 to 1997 are shown in Table 6-1. Coos County has maintained having the largest farms over this period, while Carroll County still has the smallest.

Table 6-1: Farmland Statistics from 1987 to 1997

	Farms (#)			Total Farmland (Acres)			Average Size of Farms (Acres)		
	1987	1992	1997	1987	1992	1997	1987	1992	1997
MAINE	*6,269*	*5,776*	*5,810*	*1,342,588*	*1,258,297*	*1,211,648*	*214*	*218*	*209*
OXFORD COUNTY, ME	334	346	358	70,813	63,473	63,959	212	183	179
NEW HAMPSHIRE	*2,515*	*2,445*	*2,937*	*426,237*	*385,832*	*415,031*	*169*	*158*	*141*
CARROLL COUNTY, NH	136	155	177	26,574	25,439	24,155	195	164	136
COOS COUNTY, NH	154	173	185	47,923	46,056	42,931	311	266	232
GRAFTON COUNTY, NH	356	348	406	80,871	75,733	75,883	227	218	187

Source: USDA 1997 CENSUS OF AGRICULTURE

Figure 6-1: Land Use as Rendered by Satellite Imagery



Data Sources: NH GRANIT GIS System; Maine Office of GIS; U.S. Forest Service, WMNF

Table 6-2 quantifies the amount lost or gained in these categories. All counties and the two states declined in average farm size, but Carroll and Coos Counties led this decline with losses of 30.3% and 25%, respectively. However, total farmland loss was fairly consistent, with Grafton seeing the lowest decline of 6.2% and Coos with the highest at 10.4%.

Table 6-2: % Change in Number of Farms, Total Farmland, and Farm Size from 1987 to 1997

	% Change in # of Farms	% Change in Total Farmland	% Change in Average Farm
MAINE	-7.3%	-9.8%	-2.3%
OXFORD COUNTY, ME	7.2%	-9.7%	-15.6%
NEW HAMPSHIRE	16.8%	-2.6%	-16.6%
CARROLL COUNTY, NH	30.1%	-9.1%	-30.3%
COOS COUNTY, NH	20.1%	-10.4%	-25.4%
GRAFTON COUNTY, NH	14.0%	-6.2%	-17.6%

Source: USDA 1997 CENSUS OF AGRICULTURE

6.2.2.2 Change in Forest Land

Maine and New Hampshire are the two most heavily forested states in the United States. Due to their small sizes, relative to national averages, significant changes in forest cover can occur rapidly. Forest cover in New England grew from the late 1800s to very recently. Only in the last decade have development rates overcome reforestation rates in some areas of northern New England. Estimates of forest cover from the U.S. Forest Service Forest Inventory and Analysis were gathered for the Four Counties and the two states as a whole. Inventories were conducted on different schedules in the different states, so caution is warranted when comparing percentage change between states. Maine estimates are for the years 1982 to 1995, or 13 years. New Hampshire estimates are for 1973 and 1995, or 22 years. Tables 6-3 and 6-4 show forest cover estimates for Maine and New Hampshire, respectively. The conversion of forest to farms is insignificant today, and thus any significant reductions in forest cover can be attributed to development. Oxford County and Maine as a whole demonstrate that development in the state has not impacted overall forest cover. In New Hampshire, Coos County increased its forest cover (95% to 96%) over the period from 1973 to 1997, while Carroll and Grafton counties lost 6% and 2%, respectively. For comparison purposes, Hillsborough and Strafford Counties (not shown) in Southern New Hampshire lost 12.6% and 13.7% of their forest cover, respectively, over the same period.

Table 6-3: Forest Cover in Oxford County for 1982 and 1995

	1982	1995
Maine	89%	90%
Oxford County	91%	91%

Source: USFS Forest Inventory and Analysis

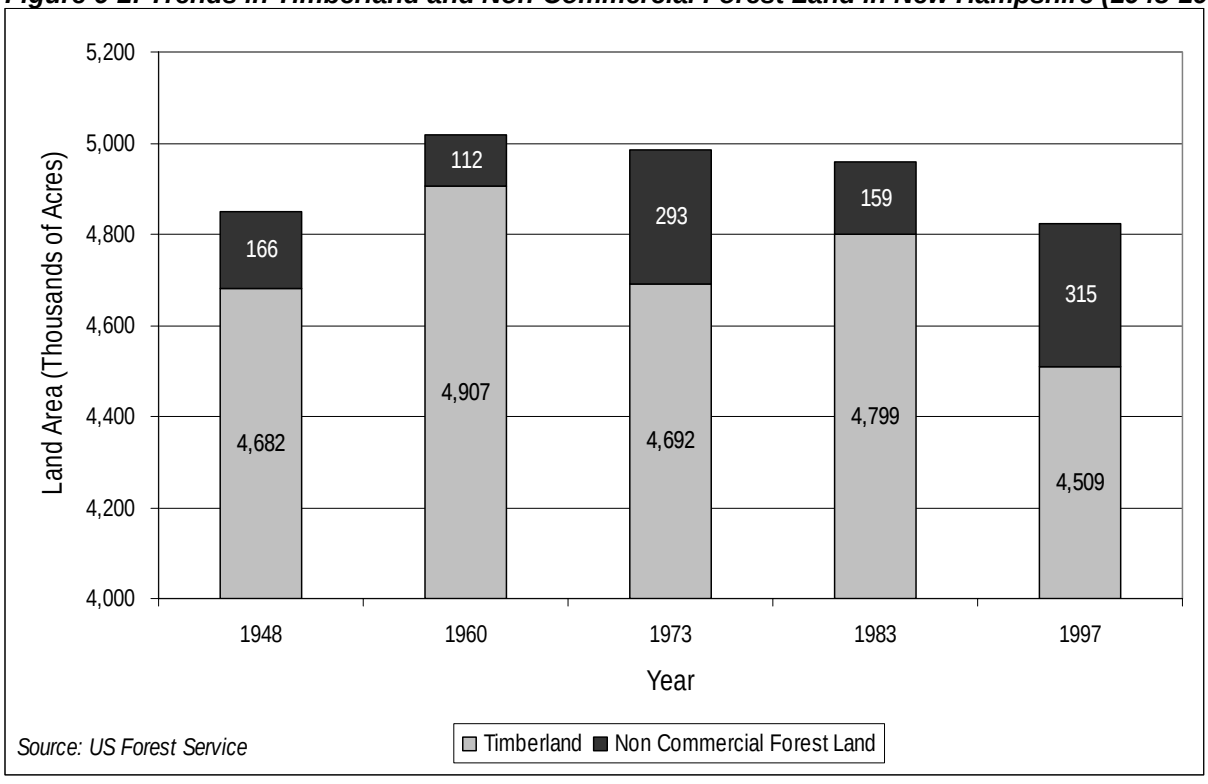
Table 6-4: Forest Cover in Coos, Grafton, and Carroll Counties in 1973 and 1997

	1973	1997
New Hampshire	86%	84%
Carroll County	92%	86%
Coos County	95%	96%
Grafton County	90%	88%

Source: USFS Forest Inventory and Analysis

Total forest cover is only one element of forest land use. Changes in land ownership or status are also important when evaluating land use. Conversion of timberland (forest that is physically capable of growing timber and commercially available for cutting) to non-commercial forest has effects on the timber supply and recreational opportunities. Figure 6-2 shows the total acreages of each forest category from 1948 to 1997[1] in New Hampshire. It is noteworthy that timberland comprises more than 90% of New Hampshire forests. Since the inception of the previous Forest Plan in 1986, available timberland in New Hampshire has declined by more than 290,000 acres (U.S. Forest, 1997).

Figure 6-2: Trends in Timberland and Non-Commercial Forest Land in New Hampshire (1948-1997)



Source: US Forest Service

[1] Following this 1997 survey, a devastating ice storm damaged many large sections of New Hampshire's forests.

6.2.2.3 Change in Developed Areas

As mentioned, the significant development in New Hampshire and Maine has been occurring in the southern areas of the two states. The Society for the Protection of New Hampshire Forests states that New Hampshire has experienced a 55% increase in new housing units from 1980-1998. Of the three counties of interest in New Hampshire, Carroll and Grafton contributed 6.9% and 6.5%, respectively, to the state's total share of new houses. Coos County had the state's lowest increase, with 696 new homes or 1.8% of the New Hampshire total. Figure 2-16 in section 2.8.1 of this report shows the trend in housing permits in the Carroll, Coos, and Grafton Counties of New Hampshire.[1]

Average parcel size for landowners in New Hampshire has been steadily declining in recent decades. From 1948 to 1997, average parcel size in New Hampshire shrunk from 114 acres to 37.5 acres (Thorne and Sundquist, 2001). Overall, development in the Forest Region is low and growth is predicted to continue along a similar trajectory to that of recent years. Factors such as large economic booms or deep recessions would naturally adjust the development patterns in the short term. Second homes, restaurants, and lodging will likely dominate the development over the next several decades. More uncertain is the expansion of the large regional ski destinations on and off Forest land.

6.2.2.4 Conserved Lands

There are many tracts of conserved public land in close proximity to the Forest. Approximately 1,142,726 acres of conserved land exist in the Four Counties. The Forest accounts for approximately 68% (777,053 acres) of this area.

These tracts are located in both New Hampshire and Maine and range widely in size and shape. Examples of these areas include State Parks, State Forests, Town Forests, the Appalachian Trail Corridor, and Wildlife Management Areas.

Figure 6-3 and Figure 6-4 show the Forest boundary superimposed on the areas of conserved lands. As shown, the majority of these areas are not connected to one another. However, some of these areas do connect or "fill in" certain areas of the Forest, such as Crawford Notch State Park and Mt. Moosilauke. Several well known tracts of conserved lands are labeled for reference. Figures 6-3 and 6-4 do not include some very large recent additions to the conserved lands in Coos County. In December 2002, the State of New Hampshire, working through a coalition of non-profit organizations and the US Forest Service, took ownership of 25,000 acres in the Connecticut Lakes area of Coos County for management as a natural area. In October 2003, a conservation easement was purchased for another 146,000 acres in this same area. Also in October 2003, the US Fish and Wildlife Service purchased 3,010 acres in the towns of Whitefield and Jefferson to expand the Pondicherry unit of the Silvio O. Conte National Fish and Wildlife Refuge.

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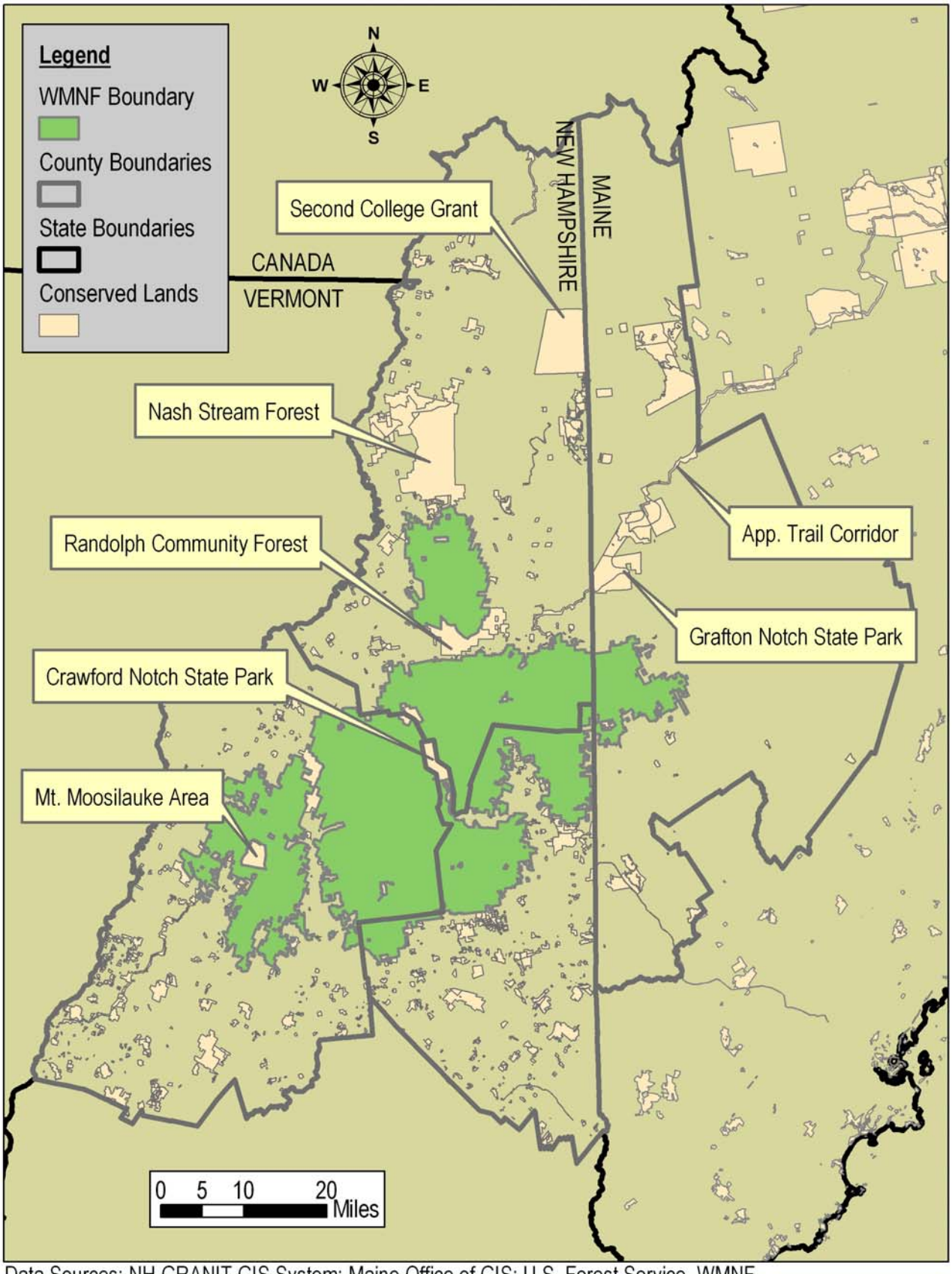
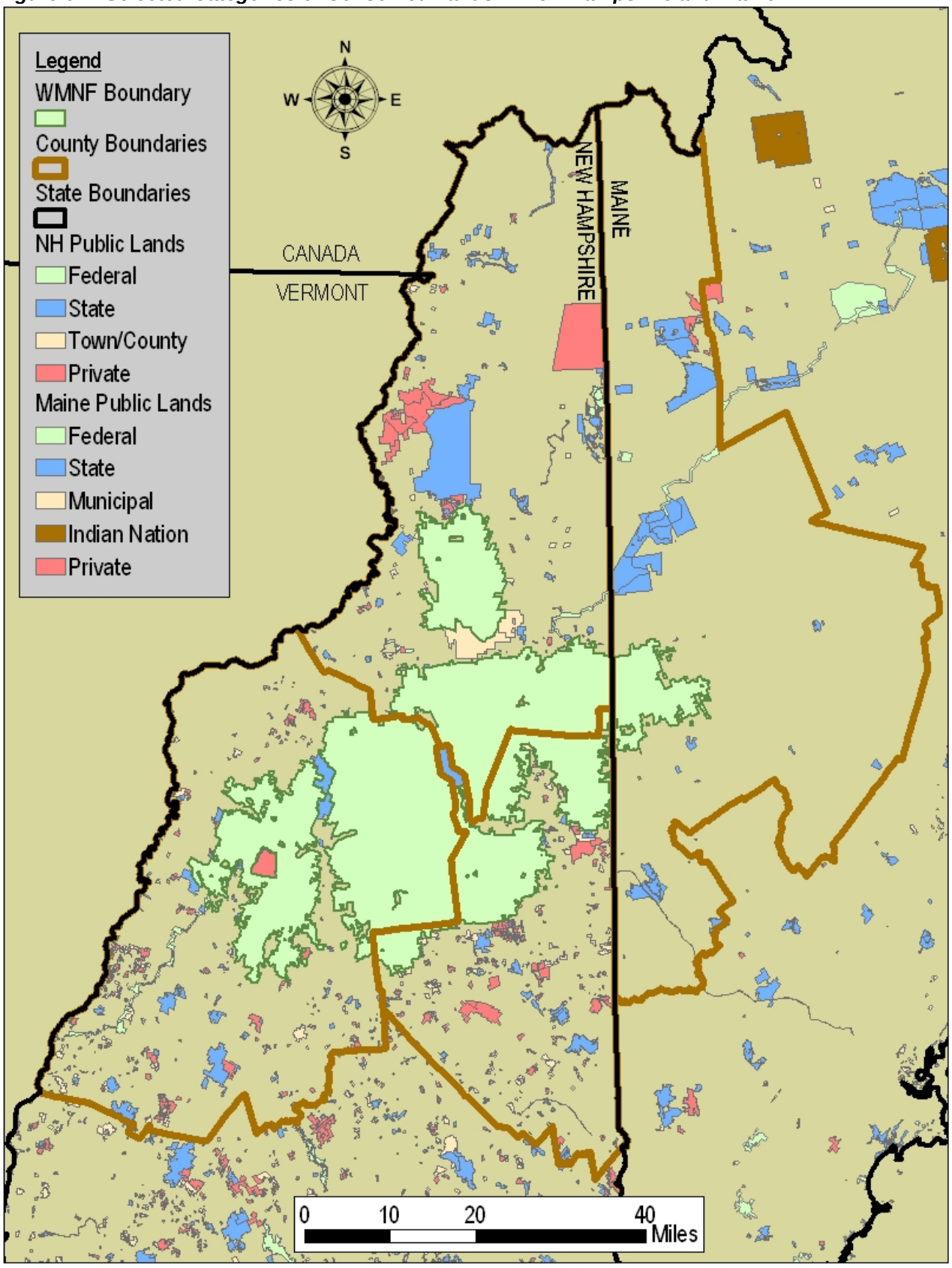
[1] Similar data were not available for Oxford County.

Figure 6-3: Conserved Lands in the Forest Region



Data Sources: NH GRANIT GIS System; Maine Office of GIS; U.S. Forest Service, WMNF

Figure 6-4: Selected Categories of Conserved Lands in New Hampshire and Maine



Data Sources: NH GRANIT GIS System; Maine Office of GIS; U.S. Forest Service, WMNF

Table 6-5 summarizes the distribution of conserved lands. As shown, the Forest comprises over 20 % of conserved lands in all counties except Oxford.

Table 6-5: Summary of Conserved Lands in Four County Region

County	Total County Area (Acres)	Total County Area Conserved (Acres & %)	County Area On WMNF (Acres & %)	Conserved County Area Off WMNF (Acres & %)
Carroll	635,006	217,951 (35%)	156,198 (25%)	61,753 (10%)
Coos	1,170,838	384,883 (33%)	231,682 (20%)	153,201 (13%)
Grafton	1,120,030	425,632 (38%)	348,400 (31%)	77,232 (7%)
Oxford	1,391,583	123,384 (9%)	49,564 (4%)	73,820 (5%)

6.3 WMNF ACQUISITIONS

Since the inception of the last Forest Plan in 1986, there have been several significant acquisitions representing 2% (more than 12,000 acres) of the WMNF area. Acquired parcels range in size from 0.01 acres to 2,146 acres. Figure 6-5 shows the distribution of these acquired lands. As shown, the majority of these lands occur at the periphery of the Forest, with the largest tracts near Randolph and Piermont. Circles were added to clarify the location of acquired lands. Historical data on land acquisitions before the 1980s is inconsistent and thus not well represented in this figure.

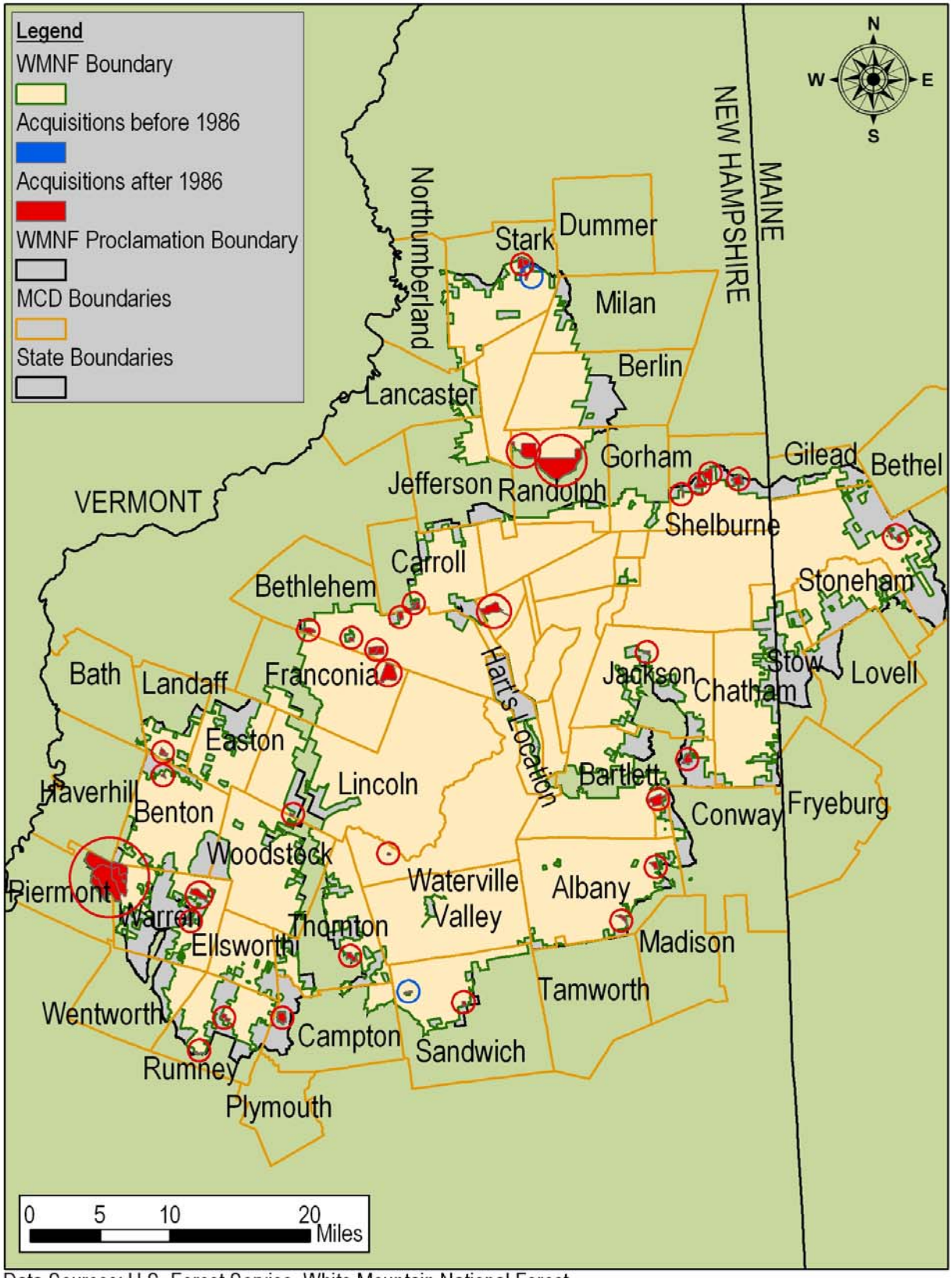
6.4 COMMUNITY OBJECTIVES & ATTITUDES TOWARDS LAND USE MANAGEMENT

Understanding the public's objectives and attitudes can provide valuable insight to the Forest planning process. To gain knowledge of these opinions, a review of attitudinal surveys was conducted and summarized here.

Studies completed in recent years shed light on community attitudes towards land use management, and specifically clarified the objectives of people in the Wider Region. Manning et al. (1998) investigated the public's attitudes regarding the management of the White Mountain National Forest. Table 6-6 summarizes the responses of fifteen attitudinal statements. The table lists the statements in descending order of agreement. The respondents were asked to indicate their opinions on each statement on a scale from "strongly agree" (1) to "strongly disagree" (5). The column titled "MEAN" is the mean of these rankings. Manning found that respondents tended to agree with statements that supported nonmaterial forest management, such as preserving the remaining undisturbed forests.

Robertson's *Assessment of Outdoor Recreation in New Hampshire – 1997* provides one of the most thorough examinations of New Hampshire resident attitudes about natural resource management. Robertson found that protecting plants, animals, and water recharge areas, and natural regions of New Hampshire ranked among the most important objectives. Providing non-motorized recreational opportunities and preserving historical/archeological areas are also valued objectives. Issues concerning motorized recreation, providing opportunities for a high level of development for recreation, and attracting tourists were among the objectives deemed less important.

Figure 6-5: White Mountain National Forest Land Acquisitions as of 2002



Data Sources: U.S. Forest Service, White Mountain National Forest

Table 6-6: Forest Policy Attitudes for the White Mountain National Forest

ATTITUDE STATEMENT	MEAN	% OF RESPONDENTS AGREEING WITH ATTITUDE STATEMENT
Remaining undisturbed forests on the WMNF should be protected.	1.5	94
The WMNF should be managed to ensure that future generations will have the opportunity to use and enjoy it, even if this means limiting current use.	1.7	91
Protecting fish and wildlife on the WMNF should be the highest management priority.	1.7	89
Clearcutting (cutting all trees in a large area) should be banned on the WMNF.	1.7	86
Recreational use on the WMNF should be limited so that each visitor (hiker, camper, etc) can enjoy the forest in peace and quiet.	1.8	84
Logging should not be allowed on the WMNF in areas where it would disrupt the habitats of animals such as bears and moose.	2	75
The WMNF should be managed to protect ecological processes, and not to favor individual plant or animal species.	2.3	71
More wilderness areas should be established on the WMNF.	2.2	64
Management of the WMNF should restrict recreational use in order to minimize ecological impacts caused by humans.	2.4	62
The opinions of professional foresters are more important than public opinion when deciding how the WMNF should be managed.	3	41
The economic well-being of timber workers and their families is more important than preservation of undisturbed forests on the WMNF.	3.2	32
Four wheel drive vehicles should be allowed to travel off roads in the WMNF.	3.5	26
Management of the WMNF should emphasize production of timber and lumber products.	3.6	22
Ski areas should be allowed to withdraw water from streams on the WMNF in order to make snow even if there are some ecological impacts.	3.8	13
The economic vitality of local communities should be given highest priority when making WMNF decisions.	3.9	8

Source: Manning et al. 1998

These findings are consistent with other work on this topic. Shields and others (2002) *The American Public's Values, Objectives, Beliefs, and Attitudes Regarding Forests and Rangelands* explores public opinion as it relates to land management and the performance of the Forest Service in fulfilling the public's land management goals. This work identifies five core objectives specific to the Northeastern region, all of which were highly agreed with by respondents. Respondents were asked to state each objectives importance to them, whether they thought the Forest Service should fulfill that objective, and their assessment of the Forest Service's performance in doing so. The following is a list of the objectives deemed most important (in order of importance):

1. Conserving and protecting forests and grasslands that are the source of water resources.
2. Developing volunteer programs to improve forests and grasslands.
3. Protecting ecosystems and wildlife habitats.
4. Informing the public about recreation concerns on forests and grasslands such as safety, trail etiquette, and respect for wildlife.
5. Informing the public on the potential environmental impacts of all uses associated with forests and grasslands.

Additionally, the study indicated the objectives that received the lowest scores from respondents. These were deemed less important:

- Expanding commercial recreation areas on forests and grasslands.
- Making the permitting process easier for some established uses of forests and grassland such as grazing, logging, mining, and commercial recreation.
- Developing new paved roads on forests and grasslands for access for cars and recreational vehicles.
- Expanding access for motorized off-highway vehicles on forests and grasslands (snowmobiles or ATVs).
- Developing and maintaining continuous trail systems that cross both public and private land for motorized vehicles such as snowmobiles and ATVs.

Though these issues were cited as the least important, there was high variability among respondents. Many people felt the issues listed here were in fact very important, and they believed it was the Forest Service that was responsible for fulfilling these objectives. These findings are again consistent with public comments on the management of the White Mountain National Forest.